SNOWFALL IN THE MOUNTAINS.

The month was one of light snowfall in the mountains of California. In certain portions of the Sierra Nevada the precipitation was slightly above the normal; but in the range as a whole, and likewise in the Sierra Madre and the Coast Range, both rain and snow were deficient. The season as a whole has been one of light snowfall. The depth and area of the snow cover were less than at the corresponding date last year and also 1911.

The snow that now remains at the high elevations will melt rapidly, and there is every likelihood that the season will be an early one and most of the passes open and available for travel by the beginning of June. The waterfalls and mountain streams will show a marked decrease in volume before the middle of June.

SPECIAL COMPARATIVE REPORTS.

Summit.—The following table shows depth of snow on ground at Summit, Placer County, on several dates in April for a number of years:

	Apr. 1.	Apr. 15.	Apr. 30.
	Inches.	*Inches.*	*Inches.*
1907	240	165	117
1908	50	31	23
1909	188	158	129
1910	65	32	12
1911	135	145	96
1912	50	30	32
1913	50	41	24

SUNSHINE.

The following table gives the total hours of sunshine and percentages of possible:

Stations.	Hours.	Per cent of possible.	Stations.	Hours.	Per cent of possible.
Eureka	231	58	Sacramento	317	80
Fresno	333	84	San Diego	322	83
Los Angeles	309	79	San Francisco	292	74
Mount Tamalpais	292	74	San Jose	300	76
Red Bluff	263	66	San Luis Obispo	267	68

There was more sunshine during the current April than during April last year.

NOTES ON THE RIVERS OF THE SACRAMENTO AND LOWER SAN JOAQUIN WATERSHEDS DURING APRIL, 1913.

By N. R. TAYLOR, Local Forecaster.

Sacramento watershed.—Precipitation throughout this watershed was below the normal for the month. It occurred, for the most part, as scattered showers during the first and second decades, with some snow in the higher levels.

Notwithstanding the shortage of precipitation all streams in the drainage basin of the Sacramento Valley rose as a result of melting snow, and their average stages were higher than during any month since the spring of 1911. They were, however, below the stages that are usually maintained during the month in question and, in many cases, were the lowest on record for April, except that of 1912.

The average stage at Red Bluff on the Sacramento River was 0.6 foot below the 15-year average and 1.8 feet above the lowest previous average for the month. At Colusa the Sacramento averaged 11.2 feet, which is 2.4 feet below the average of the past 7 years, and 4.2 feet above the lowest on record for the month. The Sacramento at Knights Landing averaged 4 feet below the normal of the past 15 years, and 4.3 feet above the lowest for the mouth. At Sacramento City the river was 4.4 feet below the average of the past 20 years and 4.3 feet above the previous low-water average for the month.

In the Feather-Yuba watersheds all watercourses rose slowly during the greater part of the month, and while they were from 1 foot to nearly 3 feet above the stages during the corresponding month in 1912 they were much below the usual April stages.

The American River carried more water than for any month since that of June, 1911. It was, however, about 1 foot below the usual April stage.

Lower San Joaquin watershed.—There was much less than the usual amount of precipitation in this watershed, but all streams rose slowly and steadily as a result of melting snow, except the Calaveras. They were, however, below the usual April stages, especially in the lower San Joaquin itself, which was nearly 8 feet below the 15-year normal.

NOTES ON STREAMS OF THE UPPER SAN JOAQUIN WATERSHED.

By W. E. BONNETT, Local Forecaster.

Except in the lower reaches of the upper San Joaquin itself, the stages of streams of the upper San Joaquin drainage area were slightly higher than in April, 1912, but they were everywhere much lower than the average April stages. Fairly heavy rains on the 13th and 14th had no appreciable effect on the flow at any point, and only during the closing week of the month were substantial rises recorded. The maximum stages at the several stations occurred on the 27th and 28th following the abnormally warm weather of the 24th, 25th, and 26th.

At Merced Falls the average monthly stage was 1.2 feet, and the range from 0.9 foot on the 10th to 1.7 feet on the 27th. The 7-year average stage at this point is 1.6 feet. At Friant on the San Joaquin the mean stage was 0.5 foot as compared with a 7-year average of 2.1 feet for April at that point. Daily stages ranged from 0.1 foot on the 9th to 1.3 feet on the 27th. Firebaugh had an average stage of −0.2 foot as compared with a 7-year average of 4.6 feet. At this station the daily stages ranged from −0.9 on the 3d to 3 feet on the 28th. The average stage in the Kings River at Piedra was 6.7 feet as compared with 5.8 in April, 1912, and an approximate average of 7.8 feet for a 10-year period. Here the daily stages ranged from 5.6 feet on the 8th to 8.7 feet on the 27th.

Shortage of rainfall during the spring months created an early demand for irrigation water and the available supply was seriously inadequate. At the close of the month some ditch systems had received no water at all.

FROST STUDIES—DETERMINING PROBABLE MINIMUM TEMPERATURES.

By Prof. A. G. MCADIE.

Loss of heat occurs in three ways—first, by radiation; second, by convection; and third, by conduction. In frost investigations the loss by conduction is unimportant and may be neglected. In fact the soil during night hours, while losing heat in other ways, gains heat by slow conduction through the earth. Air, however, is such a